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EDITORIAL NOTES

REVEALING FIGURES

HAVING withheld since the close of 1939 any statistical information concerning the Gas Industry in wartime, it gives us singular pleasure to be able to disclose now at any rate some little information on the broadest of lines to indicate the truly important effort of the Industry in furthering the Allied cause. In a nutshell, the amount of gas supplied by gas undertakings has increased since 1938 by more than 16%, and allowing for the decrease in street lighting the total increase in consumption is about 21%. In 1938, 340,000,000,000 cu.ft. of gas was made and this increased slightly in 1939, but decreased to 334,000,000,000 in 1940, due mainly to evacuation and enemy activity. Since that time the total amount of gas made has steadily grown because of the greater amount used in all factories, and for the year 1943 a total amount of 395,000,000,000 cu.ft. of gas was made. This expansion, it should be borne in mind, has taken place during a period when the domestic consumer has been exhorted to use as little gas as possible, when all types of effort have been directed to fuel economy, not only in the home, but in industry also. It should be borne in mind, too, that the consumption of the ordinary householder dominates the Industry, which consideration lends truer perspective to the great demands for gas which have been and are being met—and not only gas, but coke and tar and benzole and other vital products made from an additional 2.3 million tons of coal carbonized at gas-works (the actual figures are 18.5 million tons in 1938 and 20.8 millions in 1943). We can picture this colossal task the more vividly if we realize that the expansion represents a quantity of gas greater than the total make of the world's largest gas undertaking—the Gas Light & Coke Company—in pre-war days.

And the Industry can be all the more proud of its accomplishment—it has a right to be proud of it—in that the country's primary needs have been met during a time of many and great difficulties, a period encompassed by shortage of labour, restrictions on raw materials for plant structure, interruption of transport, the necessity of handling inferior and unsuitable coals, and the like, to say nothing of high explosive and incendiary bombs on gas-works themselves. Water gas and carburetting have, of course, entered into the scheme of things. Actually the quantity of gas oil at present being used for gas manufacture is nearly double the amount employed in the same way in pre-war days (58 million gallons compared with 32.7 million gallons in 1938). To attempt to assess the economics of all this would be wholly beside the point—which is that demands have been and are being met in quite an astonishing way. Not only the Gas Industry, but the public in general, we think, can derive both satisfaction and encouragement from the story implied by the few bald figures we have quoted. The official table of progress will be found on a later page; it tells a tale of continued determination and national service of a high order, That we anticipated that the Gas Industry would in no-wise fail in its services during the past critical years does not diminish our gratification in being able to pen this brief note, which we have no doubt will be found in some degree inspirational.

GAS INDUSTRY LITERATURE

FOR long we have admired the unfailing energy and fecundity of idea of Mr. T. A. Tomlinson, and we were glad to publish in our issue last week an article by him on the literature of the Gas Industry—a subject which, we know, he has at heart and in mind. Pre-war intermittent cries for text-books on gas manufacture and the like have of late grown into a considerable volume of appeal at a time of quite serious shortage of paper, scarcity of printing "labour," and when would-be authors (or, rather, "would be" if they could be persuaded to undertake the task) are very definitely working "whole time" to end the war as speedily as possible. Whatever the present circumstances, however, the grimness of which seems hardly likely to diminish appreciably in the immediate months ahead, we must look to the future in some sort of logical vein, realizing the importance of the education and training (we are thinking solely of "utilitarian" education and training) of those who will after the war join the peaceful ranks of the Gas Industry. How can the Industry itself feed the entrants by the written word? That seems to be the question which Mr. Tomlinson has essayed to answer, at any rate in part, and we regard his essay as being in keeping with the importance of the question he put himself. His treatment of the subject is compressed into comparatively few words, and his thoughts, essentially constructive, should be studied. It is not our intention to deal with them *seriatim* here and now, though naturally we have been and remain intensely interested in the whole problem, but we may perhaps touch on three aspects which appear to us to merit consideration.

First we must, while bearing in mind that the Gas Industry covers a very broad scientific field—engineering and chemistry, physics and mechanics, combustion and heat treatment and conservation in their widest senses—remember too the specialized nature of our Industry. We are thinking, of course, in terms of the preparation and presentation of gas literature. Even with elementary text-books giving the rudiments of carbonization and gasmaking, the principles of gas distribution, the fundamental elements of utilization of gas and the other products of carbonization, we must rely on the student's general technical groundwork in ancillary subjects. Granted this knowledge, has the Gas Industry anything to offer the student by way of a general book of introduction to what as far as he is concerned is an unknown industrial quantity? By which we mean a book, or maybe a series of books, of assured authority and as far as is practicable continuously kept up to date. The answer is that the Industry has no such service to offer. It has not so far thought it necessary to finance such a service. It has relied on "labour of love"; it has not set out to cater for the preparation and continuous revision of "elementary" literature which can be written and published individually only at financial loss, for the very simple reason that the specialized field in fact severely circumscribes the market.

Secondly, elementary text-books constitute one facet only and merely the starting-point of Gas Industry literature. Following the basis of authentic rudimentary introduction to the subject, what then is desirable? Here we encounter debatable ground

through which, however, we have ploughed a furrow which, if not exact and nicely defined, satisfies us fairly well. We are considering now what we may term the advanced student who has made up his mind to take up the Industry as a career—in other words, as a whole-time job demanding his major energies and his keenest mental application. And once again we ask what the Gas Industry *qua* Industry, as distinct from the universities, the technical colleges, and other emporia of learning, has to offer. Does it give a guiding hand to the youthful and earnest seeker after truth? Or are its methods inclined to be woolly and haphazard? Every year—indeed, every month—sees an addition in the form of papers and reports and the like to Gas Industry literature. Some of the papers and reports are excellent, and in advance of the times at the date of publication. Some of the papers and reports are perhaps indifferent, though serving a temporary purpose. Others may be of negligible value from the point of view we have in mind and are considering. All are duly published in the form of transactions and proceedings, and many a mighty tome of transactions we have handled in the past. Amid the welter of publication the guiding lights of truth lose their focus. And in this regard we thing there should be some critical agent of direction continuously employed to assist the seeker after truth. Particularlizing, the *Transactions* of The Institution of Gas Engineers abound with information of the utmost value which should, for the advancement of education within the Industry, be brought into sharp and permanent relief for reference purposes. In its own interests the Industry might well provide some means—some continuous plan—to sort without fear or favour, and not necessarily with a 100% accuracy, the wheat from the chaff as they affect the diet of the advanced student. That such a service would cost money is obvious enough, but it would be money wisely expended.

Thirdly, we come to the highly specialized sphere of Gas Industry literature, and here the field becomes still more debatable, for it does not follow that the specialist of highest skill is automatically the best interpreter. Through this field again, however, we have ploughed a discernible furrow of broad conclusions. No general book, we think, can be expected to cover the specialized field, and the critical sorting of current literature, however fruitful an exercise, is inadequate sufficiently to probe the depths. What is needed, we suggest, to meet this third need is a series of monographs by acknowledged or unacknowledged experts on particular subjects; and, once more there should be a *modus operandi* of keeping these monographs in consonance with current research—scrapping them, if needs be, in the light of new knowledge. Here again finance, organization, and the very availability of skilled and willing man-power enter into the picture. But for all three of the segments into which we have very broadly divided the field of Gas Industry literature, the Industry as such ought not to find solution impossible, and should certainly find Mr. Tomlinson's carefully written article very helpful indeed.

Personal

Mr. H. A. COLE has been appointed Engineer and General Manager to the Dorchester Gas & Coke Company, Ltd., and will take up his duties in the near future. Mr. Cole has been Manager and Secretary to the Crewkerne Gas & Coke Company, Ltd., for the past eight years, and was previously associated with the Yeovil and Clevedon gas undertakings.

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Mr. FRANK OSMOND, a Director of the Dorchester Company and previously Engineer, Manager, and Secretary for many years, who since the outbreak of war resumed duties in the place of Lt. Robert Morton, R.N.V.R., later killed on active service, will now relinquish active duties in connexion with the management of the Company.

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Mr. A. C. TREAVIS, Secretary of the Dorchester Company for the past nine years, has been appointed Assistant Commercial Manager in addition to his duties as Secretary.

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Mr. K. SNOWDON, Assistant Gas Engineer and Manager to the Colne Gas Department, has been appointed Deputy Engineer and Manager to the Borough of Wigan, and took up his duties on March 1. Mr. Snowdon was Pupil Assistant Engineer to the Hexham Gas Company, followed by six years as Assistant Engineer and Manager to the Musselburgh Gas Company, before going to Colne in 1937.

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Dr. HARRY R. RICARDO, F.R.S., has been elected President of the Institution of Mechanical Engineers for the year 1944–45.

Obituary

Mr. JOHN JAMES BAINES, who retired in June, 1939, after 60 years' association with Clayton, Son & Co., Ltd., Constructional Engineers, Hunslet, during a large part of which he was Secretary and later a Director, died on Feb. 27 in his 82nd year. Deceased had also been Secretary and Director of Deighton's Patent Flue & Tube Company, Ltd., and other subsidiary concerns of the parent firm of Clayton's, and was a Past-President and life member of the Leeds Association of Engineers. It was in 1886, when the Company was reorganized, that Mr. Baines became Secretary, and throughout his connexion with the firm he was noted for his unfailing concern for the welfare of the employees. Before joining the Hunslet firm he was for a few years with the Aire and Calder Navigation.

Letter to the Editor

Individual Enterprise

DEAR SIR,—After having listened to the clamorous demands of representatives of North Country Municipal Corporations for the handing over of the Gas Industry to public ownership, I am more than a little amused at the indignation being worked up by the Association of Municipal Corporations against the "Wooden-headed Willies of Whitehall" and the increasing menace of bureaucratic control.

Not without humour also is the correspondence appearing in the pages of the "GAS JOURNAL" from some gas engineers hailing from the same region, who are fondly hugging the delusion that under regional public ownership they would be freed from restrictions and interference and left cocks of the walk. They would soon find themselves disillusioned, and learn that the aforesaid wooden-headed Willies insisted upon having a finger in the pie, and they themselves left with far less authority than they now possess.

The greatness and prosperity of this Empire has been built up on individual enterprise, and it will be a bad day for it if ever the policy is reversed.

Bognor and District Gas and Electricity Company,
Bognor Regis.
March 2, 1944.

Yours faithfully,
S. O. STEPHENSON,
Managing Director.

Diary

Mar. 10.—Midland Counties Coke Association: Annual General Meeting, King Edward House, Birmingham, 2.30 p.m.
Mar. 14.—National Federation of Gas Coke Associations: General Committee, Gas Industry House, 10 a.m.
Mar. 14.—National Gas Council Central Executive Board: Gas Industry House, 2 p.m.
Mar. 14.—British Gas Federation Council: Gas Industry House, 3.30 p.m.
Mar. 20.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m.; Gas Industry House.
Mar. 21.—Southern Association: Committee, 11.30 a.m.; Luncheon, 1 p.m.; Annual General Meeting, 2.30 p.m. Holborn Restaurant, W.C. 1. Presidential Address of R. C. Taylor, M.B.E.
Mar. 25.—Yorkshire Junior Gas Association: Visit to the Neepsend Works of the Sheffield & District Gas Company, 2.45 p.m.
Mar. 25.—Western Junior Gas Association, Bristol: Paper on "High Pressure Storage and Distribution" by B. G. Hawkins.
Mar. 27.—B.C.G.A. Domestic Heat Services Committee: Gas Industry House, 2.30 p.m.
Mar. 29.—London and Southern District Junior Gas Association: Gas Industry House.
April 5.—Southern Association (Eastern District): Gas Industry House, 2.30 p.m. Paper by W. K. Tate, M.A., Assoc. M.Inst.C.E.
June 13–14.—Institution of Gas Engineers: Annual Meeting, Edinburgh.

Smoke Abatement Finance

A suggestion that the Gas Industry should give substantially increased financial support to the National Smoke Abatement Society was informally discussed at a meeting of the Southern Association of Gas Engineers and Managers (Eastern District) at Gas Industry House on March 1 and the Committee was asked to go into details.

The matter was raised by Mr. **G. L. Braidwood,** who said he had recently joined the Society as an individual member, and found that its annual income was not much over £1,000. Seeing that 155 local authorities were affiliated, it was evident that those, including the Gas Industry, who were concerned with smoke abatement paid little more than lip service. It was remarkable that the Society had achieved so much as it had on so small an income. Widespread public enlightenment could only be brought about by the pressure of informed opinion, and smoke abatement could not become a reality until the consumption of raw coal domestically was forbidden. He was confident this could be done by limiting the burning of raw coal in all new houses, and by gradually abolishing it, within five or ten years, in all existing houses, so as to give time for the production of alternative smokeless fuels. The post-war building of four million houses, to say nothing of any immediate building programme, would provide an unparalleled opportunity, unlikely to recur in our lifetime, and he imagined that every pound spent now would be worth several times that amount spent in a few years' time. He suggested that ten times the present annual income should be regarded as a minimum to be aimed at, and that every gas undertaking should be urged to join, with a possible scale of subscription based on output capacity. The Gas Industry could itself afford £10,000 a year merely as a matter of good finance. He understood the Society was issuing an appeal for more subscribers and increased co-operation from the Industry, and he suggested that the Association should do something about it.

Mr. **D. C. Cross** pointed out that The Institution of Gas Engineers was affiliated and contributed fifty guineas. If the Gas Industry was going to contribute more extensively to the Society it would want a change in the outlook in the Committee controlling the Society. If the Gas Industry was going to put extra money into the Society it would want fair representation.

Mr. **G. M. Gill** asked whether contributions to the Society would be allowable for income tax purposes, and there were conflicting replies, Mr. **E. L. Nicholas** stating that they were allowed, and Mr. **C. H. Chester** asserting that they were disallowed.

Mr. **W. H. Bennett** questioned whether the Association was the proper body to take the matter up, seeing that its members were drawn from only part of the country. He thought it was more appropriately a matter for the National Gas Council.

Mr. **G. Dougill** supported the principle of giving increased support, but feared that if the Gas Industry gave its support officially it would be suspected of being tainted with commercial interests.

Mr. **Bennett** reminded the members that the B.C.G.A. had supported the Society before the war.

Mr. **F. Dawson** (Chairman) said he thought one reason why Mr. Braidwood had brought the matter before the Association was that the members individually might give it their consideration and endeavour to give it their personal support.

Mr. **Braidwood** thought that if the general consensus of opinion was in favour of giving the Society increased support, it might be possible to approach the National Gas Council with a view to a private letter being sent out to the undertakings pointing out that their help was wanted. The electrical people, too, should be interested in smoke abatement, but it was obvious from the total subscriptions that their support so far had not been very tangible.

No formal resolution was put, but it was generally agreed that the Committee should consider the matter.

Gas Price Increases

In view of the outspoken comments of Mr. Frank H. Jones in his speech as Chairman at the annual meeting of the Commercial Gas Company (see last week's "JOURNAL," p. 281) concerning the financial burden the Company has had to bear through enemy bombing, special significance attaches to the announcement that the Directors have increased the price of gas by 2½d. per therm, making 1s. 4.55d. per therm. The new price will take effect as from the reading of the meter indices on or next after March 10. As from the same date the charge of 3d. per therm for the hire of prepayment meters and fittings, which is at present applied only to the first 20 therms consumed in each collection period of two months, will be applied to all therms consumed through prepayment meters. The Gas Charges Order, 1942, prohibits any increase in the price of gas without a permit from the Minister of Fuel and Power. A permit authorizing the above-mentioned increase, dated Feb. 28, has been granted to the Company.

The South Metropolitan Gas Company has raised the price of gas by ¾d. a therm, making the price 1s. 3d. a therm.

Correction.—In the report of the discussion on the recent Paper by Mr. C. Cooper (see "JOURNAL" of Feb. 23, p. 245, right-hand column) the equivalent of 1.5 parts of H_2S per million is given as 0.05 grain per 100 cu.ft. The latter figure should read 0.09 grain.

Lactifying and Pasteurizing Milk

The Duchess of York Hospital in Manchester deals largely with dietetic cases and finds the use of gas pre-eminently satisfactory for cooking, and particularly for two of the important processes of baby diet—the lactifying and pasteurizing of milk. The old methods in use had proved very unsatisfactory, and the Gas Department were approached to solve the problem. This they did in an efficient and simple manner by making a large water bath which could deal adequately with both processes.

The bath consists of a copper tank, 24 in. long by 18 in. wide by 14 in. deep and 14's gauge, with a perforated copper tray 1 in. from the bottom. The tank is contained in an outer jacket of 12's gauge sheet iron, lined with ¼-in. asbestos sheet. A ¾ in. space is left between the outside of the tank and the outer jacket for the circulation of the hot products of combustion, which finally escape through ventilation holes at the top of the outer jacket. It is fitted with overflow pipe, draw-off tap, thermometer pocket and lid, and is mounted on four legs welded to the outer jacket. The inside of the tank and tray are tin-plated and the outside is attractively finished in white and green enamel, with the exposed fittings chromium-plated. All pipework is hidden.

Two separate burner systems are fitted:

1. A 1-in. bar burner with atmospheric injector running underneath the length of the tank. This burner is used only when it is required that the water be brought up to the working temperature rapidly. The maximum gas consumption is 0.27 therm per hour.

2. Four lengths of ¼-in. wrought iron barrel, each fitted with two No. 00 Industrial jets and controlled by a separate tap, but all controlled by a common direct acting thermostat fixed to the tank. Four lighting flaps are fixed on the front.

The thermostat is graduated with two markings, one for "lactifying" (95° F.) and the other for "pasteurizing" (145° F.).

The hospital authorities are completely satisfied with this bath and find the thermostatic control and heating to be absolutely reliable. Gas consumption is very low, being approximately only 0.02 therm per hour to maintain at 145° F. Moreover, the lactifying process can be done in much less time than by the old method of hot air ovens.

Output of Gas Industry

The Ministry of Fuel and Power has released the following statistics relating to the output of gas during the years 1938–1943:

Year.	Materials used at Gas-Works. Coal (mill. tons).	Gas Oil (mill. galls).	Total gas available (thou. mill. cubic feet).
1938	18.5	32.7	340
1939	18.7	34.0	343
1940	17.3	40.2	334
1941	18.6	46.9	361
1942	19.9	52.9	379
1943	20.8	58.0	395

Dividends

Alnwick.—A dividend of 5% on the Consolidated Stock and 6% on the Preference Stock for the year.

Alliance and Dublin.—A dividend of 1% on the Ordinary Stock, making 2% for the year, against one payment of 2½% for 1942.

Cork.—A dividend at the rate of 6% per annum.

Messrs. Henry Balfour & Co., Ltd., have sent us a photograph, forwarded to them by Mr. E. R. Bearup, Engineer of the Ballarat Gas Company, Australia, of a vertical reciprocating steam-driven exhauster supplied to the Company by the firm in 1862. The machine, which operated continuously for 26 years as the one and only exhauster at the Ballarat Works, and then for a period of 36 years shared the duty with another machine, is still workable.

Members of The Institution of Gas Engineers are invited to attend the Sessional Meeting of the Illuminating Engineering Society to be held in the House of the Royal Society of Arts, John Street, W.C., on March 14, at 5.30 p.m., when a Paper entitled "Lighting the Homes of To-morrow" will be presented by Mr. J. B. Carne, B.Sc., and discussed. A card of admission may be obtained from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, S.W. 1.

For long we have emphasized the desirability, in the interests of the Gas Industry as a whole, of gas executives keeping in close personal contact with the current affairs of local bodies—Chambers of Trade and the like. We learn of a new development in Worcester in the creation of an Industrialists' Association, representing the industrialists and manufacturers of the City, and maintaining contact with the local Chamber of Trade; and we note with satisfaction that among the industrialists composing the Council of this new Association is the name of Mr. G. P. Mitchell, Managing Director and Chief Engineer of the Worcester New Gaslight Company.

ECONOMICS AND THE GAS LOAD: WORKS AND DISTRIBUTION*

A Discussion Opened by C. H. CHESTER, O.B.E.,

Director, General Manager, and Secretary, Swindon United Gas Company

I PROPOSE to outline the methods of organization and management which have been gradually applied since my appointment to Swindon some twelve years ago. Also, in view of the consideration now being given to post-war planning, I suggest that reference to likely future fields of development within our Industry and our ability to deal with them should form an important topic for discussion. In venturing suggestions on the manner in which the future should be approached, I am drawing on my actual experience over the past twelve years and my resultant unbounded confidence in the future of the Industry.

At this point I would utter a word of warning that the policies governing many undertakings must be seriously reviewed. I have discussed with many directorates, as well as managements, this vital topic. The outlook I most deplore is that which appears to be afraid of the future, and in consequence restricts capital expenditure for any scheme of development. Likewise, hesitancy in framing a progressive pricing policy to compete in new or growing markets must ultimately retard any progress which we might otherwise attain.

The first school of thought is apparently unable to grasp the economics of its own undertaking. It meticulously draws up balance-sheets and prepares working statistics, but never applies them to its commercial policy. This is sheer inefficiency.

Another prefers municipal or national ownership, for the reason that as such it is able to apply sinking funds and so amortize capital, with the result that in the main the capital per million of municipal undertakings is low compared with those company owned.

The measure of security which a rate fund, or tax, appears to provide surely tends to kill ambition and progress, which qualities should produce in the average Briton as much joy as, say, a game of golf and the reward the result of the individual effort. The municipal method of applying sinking funds is correct, and if companies do not follow this course then I fear they are heading the wrong way. However, I see no statutory objection to providing wear and tear on depreciation under income tax rules, which allow for the depreciation of capital assets in company undertakings, so maintaining a proper relationship of capital to output. If this is combined with a development policy, why should we try to hang on to present total capital expenditure, when the easiest, most economical, and soundest proposition would be to go out for increased load by extensions to our distribution systems, improvements to manufacturing plant, and these items later properly written off in the accounts. It is obvious that all development must proceed at a faster rate than capital input, and so lessen the difference between load factor and capacity of works.

Another school of thought fails to see that the only large scope for development lies in smoke abatement, or, in other words, replacement of solid fuels. We hear on many sides the applause given to men of eminence in the Industry who prove that gas can seriously challenge solid fuel in the matter of cost to the consumer, especially if efficiencies of application and so forth are taken into account, yet we appear to lack either the courage to attack those markets or the energy to tackle the extra work involved. Surely many opportunities would arise for the building of modern works with scientific equipment, the design of which would materially moderate the effects of peak load or, better still, easily deal with them.

I would like at this stage to refer to the personnel within the Industry. We must have well-paid chief officials and assistants if a high standard of efficiency is to be reached and maintained. Entry must be made much more attractive if young men of the right type are to be encouraged to join our ranks and the career of a capable gas engineer made well worth the while.

We require men willing to take a reasonable commercial risk after careful planning and backed by live directorates, with real directing force instead of mere approval. Perhaps the method of retirement affecting directors requires amendment. Both directorate and managements must therefore cease to live under the cloak of the security complex, which a public monopoly tends to encourage.

In 1932 the output of gas at Swindon was 297,604,000 cu.ft. of 450 B.Th.U., or 1,339,218 therms. Of this, 97,723,000 cu.ft., or 439,653 therms, was sold to ordinary consumers; 762,000 cu.ft., or 3,429 therms, for public lighting; 166,349,000 cu.ft., or 748,570 therms, to prepayment consumers; and 5,430,000 cu.ft., or 24,435 therms, were used on works. The unaccounted-for gas was approximately 10%, uncorrected.

The works and distribution system were in poor condition and the Directorate were faced with a capital of £889 per million.

Consumption was falling at a rate of something in excess of 5% per annum, one reason being that electric cooking was making inroads into our business. Repairs and maintenance at the works had been sadly neglected, the efficiency of the process was very low, and the plant incapable of meeting little additional load. The distribution mains were very small, so much so that pressures in those days reached 18 to 20 in. W.G. at peak hours, with the consequent ill-effects on meters and the more deplorable lack of efficiency in consumers' appliances.

A sales policy was non-existent and the average price for gas was as high as 13.09d. per therm, with rentals of meters and stoves costing as much as 2.23d. per therm in addition. That very briefly gives the position as I found it, and you will appreciate the amount of care and study which were necessary when considering the re-planning.

In the first place, as the layout of the works was very bad—in fact a good site had been ruined—I decided that all alterations carried out should, as far as possible, fit in with my desired final picture. A plan was therefore prepared showing the existing plant and proposed extensions. Secondly, a thorough examination of the distribution system was made, as I wished to obtain some idea of the future potential load of the district. At the same time, records of the age and conditions of meters were taken, as it was evident that this department was responsible for quite a portion of the unaccounted-for gas, also poor pressure to many consumers.

Incidentally, this investigation confirmed my first impressions of very inefficient wet and dry purification at the works and the resultant harmful effects on the district. I found, too, that service pipes in certain areas were in a very bad condition, and after samples of the subsoil had been analyzed it was proved that this was of a corrosive nature, and consequently many services existed only as holes through Kimmeridge clay.

It was necessary, therefore, to renew these services without delay, and many thousands were re-laid in puddled iron and double-wrapped. In those areas where the soil was most corrosive services were laid in wooden troughs and filled with pitch, the minimum pipe size being 1¼ in., which would allow for increased loads.

I gave a great deal of personal attention to the development of a skilled fitting staff and, by example, men were taught not only to become efficient workmen, but also ambassadors of the Gas Company in the way of service. It was decided that a large amount of money should be spent in this direction (later proved to be 1d. per therm), and an extensive publicity campaign was commenced by way of advertisement, demonstrations, and canvassing.

The average consumption per annum per consumer in 1932 was 15,500 cu.ft.

To obtain an estimate of potential new consumers, a survey was made of the extensive rural areas surrounding the Borough of Swindon, also those *en route* to a number of small undertakings, of which three were statutory and five non-statutory. These districts more or less formed a circle round Swindon within a radius of 15 miles, but the limits have since been extended. I concluded, therefore, that if development could be effected over a reasonable number of years, I could profitably design a new works, thoroughly overhaul the distribution system, and provide a network of high-pressure feeder mains which would enable a constant pressure to be maintained at all points. The survey showed that it ought to be possible to treble Swindon's output in approximately ten years, but it is interesting to note that in fact it has quadrupled, and the "all-in" average consumption per consumer has risen from 15,500 cu.ft. in 1932 to 35,500 cu.ft. in 1943.

In spite of the increased cost of coal and labour profit per therm has been maintained, coupled with a fall in the average price received for gas per therm. Unless the cost of coal in the future seriously upsets our calculations, an average return of 8d. per therm should be obtainable in due course, at which price, with downward variants, the field for gas is almost unlimited.

At this stage I would like to revert to my plan of campaign as and from 1932. Three years were spent in replacing defective meters and the scrapping of as many old black cookers as possible. Light meters were removed and high capacity type of ample size installed, of the du-coin type in the case of prepayment meters, and this has since proved a great boon in reducing collection labour. With regard to mains, a policy was adopted of laying one on each side of the road in populated areas, of a capacity calculated to allow for a growth of five times the existing load. To-day I wish I had catered for at least seven or eight times that load.

Improvements were commenced at the works by the installation of new wet purification plant designed to deal with a reasonable increase in throughput, and additions were made to the oxide purifiers. Simple controls were installed in the retort house, improvements made to town governors, a laboratory was instituted, and in general an attempt was made to obtain the best results possible from the existing manufacturing plant.

At the same time a bold policy was adopted on the district by dropping the flat rate price of gas by ½d. per therm and extending hire purchase and service. The results were so encouraging that further drops of ½d. per therm were made in three successive years. I always had in mind, however, the maintenance of a sufficiently high flat

* Discussion at a Meeting of the Southern Association of Gas Engineers and Managers (Eastern District), March 1.

rate to allow of the institution of promotional tariffs to act as incentives for much larger consumption per consumer.

In 1934 the first tariff was introduced for the benefit of those good consumers we had, who were continually grumbling about the heavy flat rate of 13d. per therm. This tariff was simply a straightforward charge of 10s. per quarter for any size of building and gas at 9d. per therm with a scale of discounts for varying quantities. My hopes of increased consumption were realized, and from then onwards we turned the corner.

In 1935 the major alterations were commenced at the works. As the old retort house and boiler settings occupied the best site for new carbonizing plant, it was necessary to dismantle the old plant piecemeal and immediately install the new. As there was only 18 in. between the old and new work at one time, you can imagine some of the difficulties with which I was faced. The Lancashire boilers were removed to a more central site, which allowed for the installation of waste-heat boilers at a later stage. The new plant was of the intermittent vertical chamber oven type, designed to deal with the cheapest coal then available, which came from the Forest of Dean. The capacity was 1½ million cu.ft. per diem, but in 1937 and 1938 it was necessary to increase this to 2½ millions. A new C.W.G. plant with automatic operation was also installed of a capacity of 1½ million cu.ft. per diem and two existing sets were overhauled. Extension of mains, both high and low pressure, was rapidly taking place.

I would like to mention an exhauster, power and boosting house which was built to our design in conjunction with Messrs. W. C. Holmes & Co., Ltd. I was particularly anxious to combine accessibility and cleanliness with regard to both machines and connections. The machines, therefore, were installed on the first floor and foundations arranged accordingly. All the mains connecting boxes, &c., were placed underneath this floor, but well above ground level, so that ready means of inspection were always available and repairs and extension work simplified.

We are all familiar with the "dirty corners" which, I am sorry to say, some managers appear to accept as inevitable, and which so easily lead to untidiness in mind and action and thereby inefficiency. It is a joy to me, therefore, to know that I must wipe my shoes before entering the building, instead of going through the process of a general clean-up when making my exit.

A "Visco" air-filtering system was installed, which delivers clean air within the building at a slight pressure and so prevents the ingress of flying dust and grit. The beneficial effect of this has been most marked in the saving of maintenance on the machinery, particularly bearings and exposed working parts. All the various pressure and vacuum recorders, gauges, &c., have been grouped conveniently on a central panel, so that the visiting engineer can see at a glance the information he requires of the plant in operation.

Another interesting unit installed was a Holmes electrical detarrer. The absence of tar in the dry purification plant and the labour saved through less changes of boxes has enabled this installation almost to pay for itself during the comparatively short time it has been in commission. The effective capacity of the oxide purifiers has consequently been increased and further capital expenditure saved thereby. All steam engines for exhausters, boosters, electrical generators, &c., are of the condensing type, and are coupled to a common exhaust main which leads to the condensing and filtrating plants. All steam is superheated 120°. This procedure has resulted in a large saving of fuel and water, while the economy effected in the water-softening plant and improved conditions of steam raising have proved of material benefit. You will appreciate this when I say that the total hardness of the water within the district is approximately 24°.

An interesting feature of the works at the moment is that the bulk of the manufacturing and ancillary plant is little more than eight years old, with the exception of two carburetted water gas sets, two exhausters used for water gas concentrated liquor plant, and one gasholder.

Regarding storage, there were several old holders with the Swindon Works and those of subsidiary undertakings which had masonry tanks in very good condition. As these holders fell due for renewal, it was possible to replace them with new ones of the spiral type, containing three or four lifts, thereby increasing the capacity from 850,000 cu.ft. to 1,940,000 cu.ft. in the holders concerned. Other than necessary repairs to the brickwork, no alterations were made to the tanks, which resulted in a considerable saving.

In spite of fairly heavy capital expenditure, both in the works and on the district, the capital per million can be considered low and should even drop lower as the load grows, or by the redemption of certain capital, if not required for further expansion.

I attribute much of the rapid growth in output to the introduction of a further tariff in 1935. After calculating that the overhead costs per consumer at that time amounted to approximately 50s. 7d. per annum (in 1943 this figure was 49s.), we offered a standing charge of 13s. per quarter per consumer and gas at one half the flat rate of 12d. per therm—a simple straightforward offer. As a further incentive, during the two winter quarters all consumption in excess of 25,000 cu.ft. per quarter was charged at one-third the flat rate. Present prices: flat rate, 13.5d.; tariff, 7d. and 5½d.

I made a consideration, however, with this tariff, that the consumer should have at least five appliances installed—for example, a cooker, two fires, water heater, and refrigerator; but it was sufficiently elastic to allow, say, a gas poker or gas lighting to form one item of the schedule.

A consumer was also assisted in acquiring the requisite number of appliances by buying them on hire-purchase terms over three, five, seven, or ten years. Certain items, such as water heaters, were, of course, limited to the shorter periods.

A tremendous increase in the sale of appliances followed with a corresponding rise in gas consumption. The low rate charged for the two winter quarters encouraged central heating by gas and the much larger use of gas fires. These loads were originally very poor, due not only to the high price of gas, but to the fact that a big proportion of the population of Swindon obtained coal at a cheap rate. Gas, therefore, could not be considered a serious competitor of solid fuel. Hence the need of an attractive tariff.

One very successful venture was the inclusion of a wash copper in the appliances fixed free to prepayment consumers, without additional rental. Many thousands were fixed, with the result that the output of gas from the works on Monday almost equalled that of Sunday, which still claims the heaviest load of the week. Had not the war interfered with the manufacture of appliances I am sure the average per consumer would have been considerably higher, but we hope that it will not be long before we can again pursue our activities in this direction.

You may be interested in a census taken of the various appliances in domestic premises within our area of supply. 29,026 consumers were visited and the following information obtained:

Wash coppers.	Instantaneous water heaters.	Gas fires.	Other appliances, refrigerators, gas rings, &c.
9,579	5,599	8,492	3,293

Cookers.	Lights.
26,594	31,764

With the return of normal times the demand for labour-saving appliances should greatly increase and certain fields brought much nearer to saturation point.

I intend, as soon as possible, to attack the so-called weak spots, as I consider there is much profitable business to be gained, particularly if an attractive tariff is offered to the consumer—*e.g.* we anticipate doubling the number of gas boilers and water heaters and possibly quadrupling the number of gas fires.

A consideration any undertaking must bear in mind when dealing with integration is the development of local distribution centres from distributed storage, which allows of a material levelling-out of peak distribution and compressing loads from a central manufacturing station. In other words, local storage takes care of its own peaks, and the total distribution is used at the principal works as a levelling factor on off peaks.

In 1932, 4.7% of gas was distributed in summer from the main works between the hours of 12 midnight and 6 a.m. To-day the figure has risen to 11.5%. In winter the two figures are 3.94% and 15.2% respectively during the corresponding number of hours. In other words, we have not allowed the peak loads of the supplied undertakings to be added to our peaks.

The demand for gas in the rural areas is amazing. The number of large consumers who are only too eager to take on modern amenities is proof that the Gas Industry has left untapped its rural possibilities, simply because it has assessed villages individually instead of each as providing a link in a chain which might extend over considerable areas. This aspect of the picture should be taken into serious consideration in any future planning of grids during post-war development.

I should have liked more time in which to describe in detail certain parts of our works plant, such as some interesting mechanical arrangements connected with the retort houses, but these must wait until a more convenient occasion, when the proper technical data can be presented in a readable form.

In closing I would say that we have proved that it pays handsomely to maintain plant in a tip-top state of cleanliness and efficiency with fine control of pressures, temperatures and so on. In fact I would say that a 5% additional capital cost on plant for refinements is well worth while in order that our valuable raw material, coal, can be treated in the most scientific manner.

[*Our report of the ensuing discussion will be published subsequently.*]

Yorkshire Juniors

The Yorkshire Junior Gas Association President's Day on Feb. 26 was marked by a tour of the works of the Park Gate Iron and Steel Company, Ltd. About 70 members of the Association were conducted round the works by members of the staff. The electrostatic gas cleaning plant evinced keen interest from the visitors, the path of the incoming dirty gas and the subsequent stages of purification being fully explained. Mr. W. S. Allen (Chief Constructional Engineer at the Works) was responsible for the arrangements of the tour and he welcomed the visitors, saying that he believed it was the first time that the Association had toured the works. He congratulated Mr. V. J. J. Siddons (Gas and Water Engineer to the Rawmarsh Urban District Council) on his being elected to the Presidency of the Association.

Mr. J. R. Firth, of Bradford, moved a vote of thanks to the management of the Park Gate Iron and Steel Company, which was seconded by Mr. C. A. Newham, of Leeds.

BENZOLE RECOVERY BY ACTIVATED CARBON*

By R. WALKER, H. C. APPLEBEE, A.I.C., and A. K. HOWELL,

Manchester Gas Department

PREVIOUS to the erection of the present activated carbon plant there had been in operation at the Rochdale Road Works an oil recovery plant, erected in 1932. With certain modifications by the works staff this plant had an output which was progressively increased until it reached 1.7 gall. per ton of coal carbonized, and occasionally even more. Within the limits of its capacity it was a very efficient benzole recovery plant. This oil recovery plant, however, was quite inadequate to meet the greater demands brought about by increased capacity of the carbonizing plant, and by the demand for benzole and toluene owing to the war.

Consequently it was decided to sell the old plant and to replace it by a larger one. But it is worthy of note that during its life of 11 years the old plant had produced 992,000 gallons of crude benzole, bringing in a revenue of some £30,000, the cost of the original plant being £535—excluding foundations, &c.—while the oil washer, already in operation as a naphthalene washer, had cost £1,390.

In accordance with the usual practice tenders were invited for a new benzole recovery plant, without restriction to any particular type or design. Consequently tenders were received for both oil washing and activated carbon plants. After due consideration the Gas Committee decided to accept the tender of Messrs. Sutcliffe, Speakman & Co., Ltd., for an activated carbon plant, for the following reasons:

(1) The plant is automatic and easy to handle.
(2) The guaranteed maximum yield of benzole was the highest.
(3) There is no entrained oil in the benzole.
(4) Back-pressure is not excessive.
(5) The absence of oil lessens the risk of fire, and tends to cleanliness in working.
(6) The oil-washing process is dependent on imported oil, whereas the activated carbon is home-produced.

The capital cost of the new plant was as follows:

Plant	£8,923
Building	2,625
Cooling tower	1,510
	£13,058

The plant is situated at the outlet of the purifiers. It is contained in a one-story brick building, with a reinforced concrete roof, thick enough to withstand penetration by incendiary bombs. Ample windows are provided on three sides of the building, giving adequate light during daytime. Flame-proof lighting and switches can be used at night.

The main parts of the plant are as follows:

4 adsorbing vessels, each holding approximately 1 ton of activated carbon.
2 sets of automatic valve gear with electrically driven compressors.
12 automatically operated gas valves (3 to each adsorber).
4 automatically operated steam valves (1 to each adsorber).
1 water tubed gas cooler.
4 water tubed benzole condensers.
1 benzole-water separator.
1 benzole measuring tank.
2 benzole storage tanks.
1 condensate catch pot.
1 recirculating-gas fan—steam turbine driven.
1 water circulating pump—steam turbine driven.
1 benzole loading pump—steam driven.
1 condensate ejector—electrically driven.
1 brick water-cooling tower, board filled, with forced draught.

Instrument panel, pressure gauges, thermometer, &c., are fitted for the control and regulation of the plant.

The plant is entirely automatic in operation and needs only occasional supervision.

There are three main stages in the process—*viz.*,

(1) *Adsorption.*—The rich unstripped gas is passed from the outside to the inside of the annular ring of the adsorber passing through the carbon, where the benzole, &c., is retained.

(2) *Steaming.*—At the conclusion of the adsorption period all the gas valves of the individual adsorber close in order. As the valve to the outlet gas main closes, a quick acting steam valve opens, admitting steam to the inmost section of the adsorber—*i.e.*, in the opposite direction to the gas flow. The temperature of the carbon bed rises, the occluded gases are liberated, and are swept out of the adsorber. These gases, together with the water vapour, pass through two condensers in series, where all the condensable vapours are deposited, the condensate flowing away to the separator. Any gases or uncondensed vapours pass through the condensers into the adjacent adsorber.

In one pair of adsorbers, while No. 1 is adsorbing, No. 2 is steaming, while in the other pair No. 1 is drying and No. 2 adsorbing. Thus two of the adsorbers are always adsorbing, while one is steaming and the other drying.

Exhaust steam from the two turbines is used. Hence it will be apparent that with always one of the adsorbers steaming, the exhaust steam is as fully utilized as possible, thus ensuring the greatest economical use of steam.

(3) *Drying and Cooling.*—At the conclusion of the steaming period the carbon is left in a hot damp state, and must be dried and cooled before it will efficiently adsorb more benzole. This is accomplished by tapping off stripped, cooled gas from the outlet of the plant, and by means of the recirculating fan blowing it through an indirect steam heater where the gas temperature is raised to 120°–130°F., and so on to the adsorber. The water in the carbon is picked up by the warm dry gas, and the carbon bed is partially cooled at the same time. The final cooling is completed by the cold unstripped gas at the commencement of the next adsorption.

All the gas passing through the adsorbers, whether the main stream, or the recirculated gas, is cooled to atmospheric temperature by the gas cooler before leaving the plant.

A complete cycle thus consists of an adsorbing period, a steaming period, and a drying period, the first occupying twice the time given to the others (*e.g.*, adsorption 60 minutes, steaming 30 minutes, drying and cooling 30 minutes).

These are the main outlines of the process. Further details of the plant now follow:

The four adsorbers are arranged in two pairs, each pair working independently if required. They are cylindrical vessels, 11 ft. 6 in. high and 5 ft. diameter, containing an annular ring which holds the carbon (approx. 1 ton).

The unstripped gas (and, later, the recirculated gas) enters by a fan-shaped casting underneath the main body of the adsorber, and is admitted to the outside of an annular ring. After passing through the carbon, the stripped gas leaves the centre section of the adsorber through the outlet valve into the outlet gas main.

Steam enters the centre section of the adsorber by a vertical pipe opening out to a funnel at its upper end. A deflector plate is fitted in the mouth of the funnel, its position being adjusted by a nut on the top of the adsorber cover, the position of the plate thus controlling the supply of steam to the individual adsorber.

The annular ring is filled with activated carbon by means of six openings at the top of the adsorber. A cylindrical curtain, forming part of the adsorber top, projects downwards into the top of the carbon bed, preventing gas from by-passing as the carbon settles down, which it does after a month or so at work.

The carbon is emptied through two pipes which project downwards from the bottom of the annular ring through the inlet gas space, and terminate in two seal pots which are removed to allow the carbon to pour out.

The automatic gas valves are closed by means of compressed air, which is admitted to the inside of a rubber diaphragm. The diaphragm, distending with the pressure, pushes a "mushroom," which in turn operates a rod connected to a disc-shaped gas valve. On the push-rod is fitted a powerful spring, in compression when the valve is shut. When the compression is released, the spring returns to its normal position, so opening the gas valve. It is a noteworthy feature of the plant that any breakdown of the compressors has the effect of opening all the gas valves. Each cam-shaft and air compressor set is driven by one electric motor (1 h.p.), the compressor directly, and the cam-shaft through a reduction box and gear train. The speed of the cam-shaft (and thus the time for the complete cycle) is controlled by a system similar to the well-known extractor gear of West's retorts. A lever fitted to the side of the cam-box indicates the time for the adsorption period (*i.e.*, half of the time for a complete cycle) and the lever is used to adjust the cycle as required.

The quick-action steam valves are similar to thermostat valves. When the valve is opened a spring on the shaft is compressed, and later returns the valve to the closed position when the pressure of the spring is released.

The water-tubed gas cooler is a vertical cylindrical vessel 17 ft. high by 5 ft. diameter, mounted in the outlet gas main, with a centre partition, the gas passing up the first section and down the second on the outside of the water tubes. The gas is cooled from between 80° and 100°F. to atmospheric temperature.

The water-tubed benzole condensers are 5 ft. high by 1 ft. 3 in. diam., mounted in two pairs between the gas inlets of each pair of adsorbers. Each pair is connected in series with separate offtakes from each, the offtakes in turn connecting with a common run-off pipe, to a vapour trap, and the separator.

The separator is a cylindrical tank of about 1,000 gall. capacity, the benzole overflowing from it by a glass sight-box to the benzole measuring tank, the water flowing over an adjustable weir into the catch-box. The benzole measuring tank will comfortably hold the maximum make of benzole per shift. By changing two valves, the loading pump is used to pump benzole from the measuring tank to the two large storage tanks.

(*To be continued*)

* From a Paper to the Manchester and District Junior Gas Association.

THE WORK OF THE GAS RESEARCH BOARD

While plans are being formulated for a wide expansion of their research programme and for a central research establishment worthy of the Gas Industry, the greater part of the Board's research work is still being carried out at Leeds University in the Department of Coal Gas and Fuel Industries with Metallurgy. It is, of course, under the control of the Director, but is reviewed at regular intervals by a Joint Research Committee under the Chairmanship of Dr. Hollings, and consisting of several members of the Council of the Board, Professor Townend, Professor David (engineering) and Professor Evans (Physical Chemistry) representing the University, and Mr. Shapley, the Gas Engineer and Manager for Leeds.

The Fourth Annual Report of the Gas Research Board, which will be issued shortly, contains for the first time technical details of these researches and of others which are being carried out elsewhere.

The photographs were taken on the occasion of the last meeting of the Joint Research Committee which took place in the University.

Fig. 1 shows an experimental apparatus used for the study of the catalytic synthesis of methane from hydrogen/carbon monoxide mixtures. As a result of work on this scale the process is now ready for translation to a larger scale, a procedure which will involve the solution of difficult problems in chemical engineering.

Fig. 2 shows the infra-red spectrometer which is being used for the study of the fundamentals of thermal radiation from different substances, the ultimate object being to apply the knowledge obtained to problems of heating and drying and to thermal radiation in general.

Figs. 3, 4, 5 and 6 are laboratory views showing the nature of the apparatus necessary for the investigation of the more theoretical aspects of certain research problems.

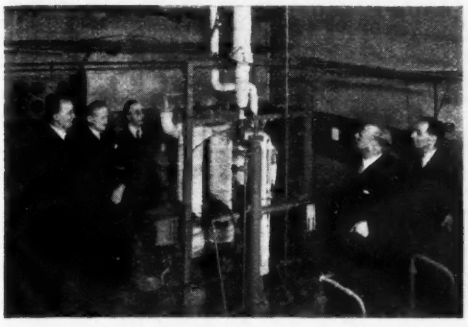

FIG. 1.—*Members of the Joint Research Committee inspecting an intermediate scale apparatus for the catalytic synthesis of methane under pressure. Present: Professor D. T. A. Townend, Dr. J. G. King, Mr. J. E. Davis, Dr. H. Hollings and Dr. F. J. Dent.*

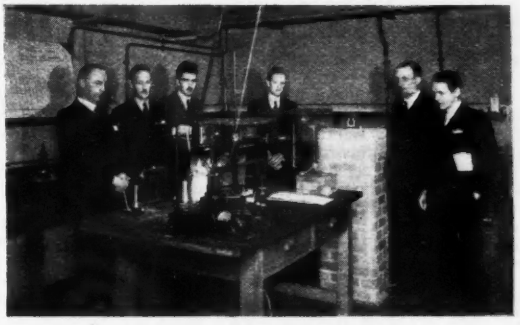

FIG. 2.—*Apparatus for the investigation of the emission and absorption of infra-red radiation. Present: Dr. H. Hollings, Dr. J. G. King, Mr. R. Long, Dr. A. L. Roberts, Professor D. T. A. Townend and Professor M. G. Evans.*

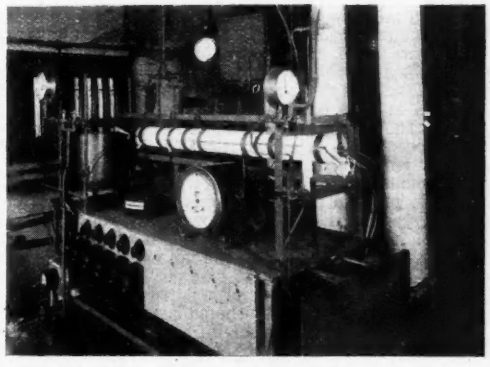

FIG. 3.—*Small scale apparatus for the study of the catalytic synthesis of methane under pressure.*

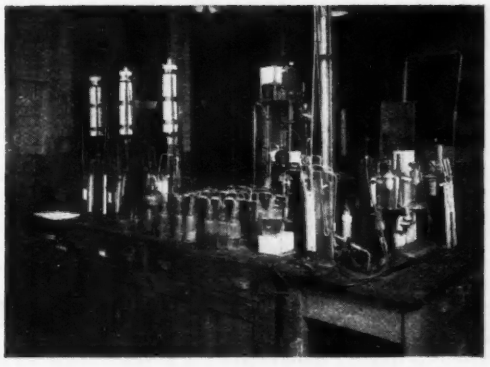

FIG. 4.—*Apparatus for the study of methods for the removal of organic sulphur compounds from synthesis gas and town gas.*

FIG. 5.—*View in the laboratory: In the foreground experiments are in progress on the synthesis of methane over a nickel catalyst.*

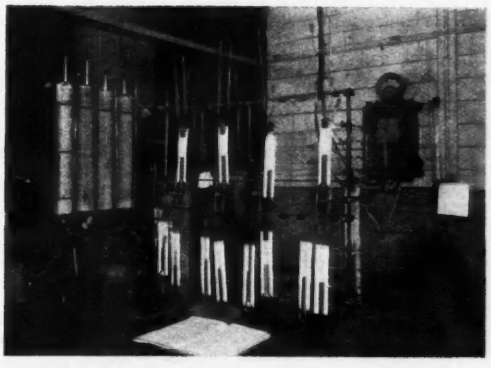

FIG. 6.—*View in the laboratory: Apparatus for the study of the structure of catalysts for different purposes.*

PLASTICS AND THE TAR INDUSTRY

The need for closer co-operation between tar distillers and the plastics industry was urged at a joint meeting of the Plastics Group of the Society of Chemical Industry and the Association of Tar Distillers at Gas Industry House on Feb. 28, when Dr. Herbert Levinstein and Mr. J. Idris Jones, of the Chemical Research Laboratory, introduced a discussion on "Plastics and the Coal Tar Industry."

Major T. Knowles, Controller of Tar Products, Ministry of Fuel and Power, who presided, said he looked forward to the time when the tar industry and the plastics trade would get closer together, and when coal would be regarded not only as a source of heat, but as a raw material for the creation of those products that would result in the biggest turnover. The tar industry, which had worked excellently with him since he had been Controller, was anxious to associate itself with those industries that used its products.

Dr. Levinstein said that all the raw materials for the plastics industry could be found in Great Britain's coal supplies, and the Gas Industry and the coking industry were therefore enormously interested. Plastics did not require raw coal or coke, but only its liquid and gaseous products, with the one exception that coke was used for making carbide, a valuable raw material for plastics. Great progress had been made in Germany and America in the use of by-products from coal, particularly methane, and there were good reasons why gas-works and coke ovens should become partners with the plastics industry. Before the war large consumers were buying town gas at as low as 2d. per therm, equivalent to methane in the form of coal gas at £4 6s. 8d. per ton, and hydrogen at about £10 10s. The average price to the domestic consumer was about 8d. per therm, representing £42 per ton for hydrogen and £19 for the methane contained in the gas. Statutory gas undertakings obtained something of the order of £80 million for their gas, of which some £56 million represented the hydrogen and methane.

In the case of coke oven gas there would be no great expense involved in separating the hydrogen and methane. It had been done in the Ruhr for many years, hydrogen being the main objective. Excluding the 200,000 tons of ethylene contained in town gas, a substantial proportion of the 200,000 tons contained in coke oven gas could be recovered. A coke oven plant with a throughput of 1,000 tons of coal (the smallest economic unit for the recovery of by-products) would produce over ten tons of ethylene per day. If only half of it was recovered and converted to vinyl chloride and sold at market price the profit would amount to £5 for every ton of coal carbonized, or a total of £5,000 per day. Development of the by-product and plastics industries required above all else a large production at low cost, rather than a small production at a high rate of profit. For those coke oven plants which sent their gas into grids it might be a convenient arrangement to have a large plant for the extraction of hydrogen, methane, and ethylene. For this purpose the gas could be by-passed from the grid. To maintain its calorific value at, say, 500 B.Th.U. might seem a little difficult, but it could be done.

There was a considerable use for ammonia in the plastics industry for the transparent resins, nylon, &c. The 43,000 million cu.ft. of so-called "free" coke oven gas before the war contained about 65,000 tons of hydrogen, which was equivalent to about 370,000 tons of ammonia, or about 1½ million tons of sulphate. The ideal thing for the plastics industry to make from the gas would be HCN, which was largely required to-day. A very pure form could be got from methane and ammonia, both of which should be taken out of the gas from gas-works and coke ovens. It was a very attractive reaction, and one that should be carefully studied.

Methane was formerly considered one of the most sluggish of gases and the despair of the synthetic chemist, but it was now used, especially in America, in a very large way for making methanol and formaldehyde. Great progress had been made in the production of acetylene from methane, and that was a matter of prime importance in this country because it might short-circuit the use of carbide, although carbide would still be required for making cyanamide. The manufacture of cyanamide from carbide and nitrogen had been known for 50 years and yet we, as an industrial country, a coal country living by wasting coal, had not had the enterprise to make even such a well known chemical, but we had imported it from America. Ethylene was not far behind in its usefulness for a wide range of important substances.

Nothing in the world would stop German chemical industry from becoming a very important factor, and that was one of the things to be considered in making post-war plans. It was quite certain that synthetic rubber would continue to be with us, and we must have something to supplement our raw materials from coal. That was to be found in the 10 million tons of imported crude oil. We must have a refining industry in this country, so that we could produce the most expensive and valuable products. To do this successfully there must be a close alliance between the plastics industry, the coke ovens, the Gas Industry, and the oil cracking industry.

Mr. J. Idris Jones said one thing was certain, and that was that we had not made the best use of our coal resources. The conservation and utilization of that raw material and its by-products to the best possible advantage must be the keynote of all future planning and endeavour. With the return of peacetime conditions, what was likely to be the attitude of the carbonizing industries to benzole recovery, and how far would the loss of calorific value in the gas affect the issue? What were the possibilities of future expansion? Was it practicable to work up vertical retort crude benzole to benzene, and if so what contribution would it make to national economy? Should we resort to cracking in order to supplement our benzole production? Pressing claims had been made for the revocation of the hydrocarbon Duty, and no doubt further demands would be made after the war. If that came about how would it affect the position of benzole? There should be a closer link between research on gas and research on tar; the two things could not be divorced from each other. Active steps should be taken to explore the possibilities of extending benzole production during carbonization. Considerable attention had been given to the processing of coal for motor spirit; taking the long view, should not more attention be given to the processing of coal with a view to the maximum output of important chemical raw materials? What were the post-war prospects of phenol production? It might be noted that the present production was not capable of much further expansion except by increased resort to synthetic methods. The importance of phenol as a raw material for the plastics industry should be stressed.

So far no major application for pitch had been discovered, but results of some work on the production of high-grade carbon black had indicated that material suitable for reinforcing rubber and other products could be made from such crude materials by an impingement process. What demand was the plastics industry likely to make for such reinforcing agents?

The Chairman said he had expected a question to be asked as to what the tar industry was doing about taking out naphthalene. The tar industry had taken out all the coal tar products that the country had required, and he was of the opinion that if the country in peacetime called for more naphthalene it would get it.

Mr. C. J. Goodwin suggested that the coking industry should be a little bolder in the future and take out the hydrogen and make its own natural gas, which was, to all intents and purposes, methane. In the United States natural gas was pumped for thousands of miles under pressure, and we could do it in this country along the railways, though actually very much of it in the United States was stored as a liquid. By using very low temperatures it was possible to store 600 times the original volume, and he suggested that something of the kind should be done in this country.

Dr. W. Scott said it was good to see the tar trade coming forward to satisfy the future demands of the plastics industry. It was necessary to think 10 years ahead, and he would express the view that we were heading for a naphthalene shortage. He based that view on the large requirements for alklyd resins and others based on naphthalene in the years to come, and not on present requirements, supplies for which were ample. The tar industry was capable of getting a lot more out. Most of the phenol was being extracted, but it was not sufficient to meet potential requirements. With regard to economics, it had been said that we should not be able to import a number of materials, but would have to produce them ourselves. Unless we could produce our chemical raw materials cheaply, however, it would be far better to import them. He had submitted in a Paper he presented in Birmingham recently that the tar industry could not meet the future demands of the plastics industry. We had to base our future on what we saw in America, and to think in terms of hundreds of thousands of tons. He suggested that the tar industry should be very co-operative. The thing to do was to set up some sort of regional grouping—possibly something of the kind had already been discussed—with centralized research for the development of tar products. Why did not the tar industry, for instance, make its own tar? Why depend on the Gas Industry and the coke ovens? And why not turn coal directly into chemicals?

Dr. E. G. Couzens (Chairman of the Plastics Group) suggested that while it was of the utmost importance to consider the potential output, the most important thing was the price. It was price that determined the matter in the long run, and from the confusing figures that were at present available it was not possible to lay down any definite principle.

The Chairman said the meeting had led him to the conclusion that there was a lack of contact between the brains of the plastics industry which were looking to the future of that industry, and the brains of the tar industry which were prepared to meet the requirements of the future. They should see what could be done in the real planning of an association of these two industries after the war, and he looked forward to the possibility of some investigation being done by the two industries in co-operation, without letting either their technical dreams run away with them or their commercial minds lack balance. Association of the two industries could do a great deal, and from his own knowledge he could assure the meeting that the tar industry was extremely anxious to find ways in which it could work with the other industries. He hoped too much stress would not be laid upon price. There was often one price for a product so far as a company's balance sheet was concerned, and another price that the country could afford to pay for that product, which went down on the country's balance-sheet, and it was sometimes a very wise thing to pay a little

more for a home produced indigenous product than to import something that had to be paid for abroad. A careful review between the two industries was called for, and if the Plastics Group, the Association of Tar Distillers, and other interested organizations could come together, he thought they might forget some of the difficulties of the past, and see what they could do to effect advantageous co-operation.

PURIFICATION

The following discussion took place on the Paper given by Mr. H. B. Avery to the Scottish Junior Gas Association—see "JOURNAL" of Feb. 16 and 23:

Mr. **Fulton** (Dumbarton) asked Mr. Avery where the thermometer should be placed on the box in the case of a downward flow gas. He enquired where was the best place to introduce the live steam to the box.

Mr. **Avery** replied that the measurement of temperature was generally made in the gas main, but this did not indicate the temperature of working in the oxide. In some cases temperatures of 116° in the oxide had been noted when the thermometer in the gas main at the outlet showed 74°. The amount of H_2S present in the gas did not greatly affect the capacity required in the boxes, as removal of small amounts of H_2S required as large a time contact figure as larger quantity. It was advisable, however, to allow somewhat larger capacity when excessive percentages of H_2S were present. A box should be discharged, if possible, from the last taker position, laboratory records showing when it was necessary to do so. As a box was seldom emptied before the condition of the set necessitated this being done, it was not generally possible to leave the material lying in the box for any length of time, nor was this of any particular advantage. The keeping of records was very important, and such records should show the H_2S content at the inlet of the first box and the inlet of the second box, the amount of oxygen at the inlet and outlet of the set, and the temperature and the back-pressure of each box. Such figures should, if possible, be taken daily. Live steam should be introduced at the nearest possible point to the box inlet and provision made for admission to any box in the set.

Mr. **Doran** (Edinburgh) said the Paper implied that the activity of artificial oxides was not so good as that of natural oxides. He disagreed with this view, as they have found them to be very successful at Granton Works. The box had a 6% tar content which was reduced to 3%. They found that the box was caking by the use of sawdust, and had now substituted peat, which had completely done away with this caking.

Mr. **Avery** replied that he was fully aware of the excellent work done by Mr. Doran in this connexion, but suggested that the results could not be attributed to the working of burnt spent oxide, as a considerable amount of preparation of the material had been done. Burnt oxide worked to some extent dependent very largely on the capacity of the box. With regard to the tar content, the figures so far obtained had been somewhat disappointing. It was impossible to obtain an oxide entirely free from so-called tarry matters, probably arising from gaseous hydrocarbons. Some hardening of the oxide was inevitable, and spent oxide had been likened to frozen earth. The introduction of a somewhat irregular lightening material, such as peat, which would give lines of cleavage, would assist in breaking up the spent material and making it easier to discharge from the box. Spent oxide was usually regarded as fully fouled at 50% of sulphur, and acid manufacturers were inclined to base their workings on this figure. Where wide fluctuations occurred the working of the plant was affected, and for this reason a high sulphur content in the spent oxide might be undesirable. If, however, all spent oxide regularly contained 60% of sulphur there was no doubt that this percentage would be acceptable. One undertaking producing spent oxide containing approximately 60% of sulphur used only 70% of the fresh oxide which would normally be required if a 50% sulphur content only were obtained. A great saving in the amount of fresh oxide could thus be effected.

Mr. **Masterton** (Edinburgh) said the question of temperature was important, as it caused inactivity if it was too low and acidity if it was too high. He would like to know if it was too difficult to install an automatic thermostat for heating. Had no way been devised whereby the box could be tested without having to open it?

Mr. **Avery** replied that thermostatic control would be difficult on account of the delicate nature of the apparatus, particularly under the condition on purification plants. There was no other reason why it should not be successful. Estimation of the moisture content of the oxide in the box from the humidity of the gas at the inlet and outlet had been attempted, but had not proved successful. Where temperature records were kept and steaming was practised the temperature records would give a good indication as to whether the moisture content in the oxide was being reduced.

Mr. **Greig** (Glasgow) thought purification was one of the most interesting processes in the Gas Industry. They had four boxes, and he would like to know what the advantage was in having five boxes. Regarding records, they had kept these for some time now and had found them of great advantage. Each box was recorded separately and they always emptied each alternate box, so that each set had two new boxes. This was done after a 6 months' run. They had no catch box fitted, as he thought H_2S often passed when this was used, and he also thought that the H_2S content should be *nil* at the fourth box. He would like to see a meter fitted to each set for the preferential gas flow. Purification was a highly technical job, and if they could modernize on the subject, oxides would do the work satisfactorily.

Mr. **Avery** replied that several English undertakings had installed four working boxes with a catch box. In many cases these sets had now been altered to working sets of five boxes. In the case of four working boxes a change had to be made when not more than 2½ boxes were fouled. When five boxes were working it was possible to work with 3½ fouled. Thus, during the discharging of a box less purifier capacity was inoperative. Flow meters were of very great assistance where several sets were working in parallel. Without flow meters it frequently happened that a box might be discharged which was in quite good working condition, while boxes in other sets through which very little gas was passing appeared to be in good condition, but were, in fact, incapable of dealing with any large flow of gas. When filling a new set of purifiers it was advisable to "step" the oxide by mixing fresh material with varying percentages of spent oxide, so as to reproduce the conditions under which the set should function under normal conditions. The oxide in the first box should be approximately 75% spent, in the second 50% spent, in the third 25% spent, and in the fourth all new oxide.

Mr. **Dow** (Kirkcaldy) said he was interested in liquid purification and felt they needed a much simpler method of purification. Caking had been mentioned, and he too had found that peat was very much better to prevent this taking place. They had a system of recording at Kirkcaldy which was done by the use of different colours for the different readings. They had found that live steam was sometimes doubtful, as the box might be dry, but might be flooding, as they had found to be the case. The box might cut-out due to a fall in atmospheric temperature as sometimes happened in winter time.

Mr. **Avery** agreed that liquid purification was attractive, but there were many points which required consideration. The cost of compressing the gas to overcome the back-pressure of boxes was largely balanced by the increased cost of pumping, upkeep of the pumps, and both mechanical and chemical supervision often beyond the capacity of a small works. The sulphur produced in some cases at any rate was impure and had a very high moisture content. It might be unacceptable to sulphur users, and it would be costly to produce in a saleable condition. Few liquid purification systems were 100% efficient and some oxide purification was necessary. Another factor which must not be overlooked was the large amount of capital at present sunk in dry purifiers which were still capable of carrying out their work, and this large capital could not be lightly disregarded. With regard to steaming, it was unusual for oxide to become too wet if the steam was admitted under proper control; it was much more common for oxide to become too dry for efficient working. Oxide was crude material, and sawdust was one of the few materials which could be reasonably used as an extender. The quality of sawdust obtainable at the present time left something to be desired, and it was expensive owing to high moisture content. During the war little of the most suitable type was available, and the material was now derived from hardwoods, had a high moisture content, and was mostly of rather small size.

Mr. **Henderson** (Dalkeith) said they had been using burnt oxide for five months now, and their main difficulty was back-pressure. They used shavings, and had cut this down by inserting 3-in. stand pipes, which had helped greatly.

Mr. **Avery** replied that he had not heard of this method of obviating back-pressure, and would have expected by-passing of the gas to result. Back-pressure was sometimes the result of compacting of the oxide, but was also frequently caused by a shallow layer on the top of the box being rendered impervious by a tar-water emulsion.

Dr. **Wheeler** (Chief Chemist, Manchester Oxide Company) said that it was his job to organize and direct the Company's research, and in this research oxide was given a good deal of prominence. The preliminary work was carried out on the small scale in the laboratory, and then extended to the semi-technical scale in the Company's experimental plant erected through the courtesy of the Manchester Gas Corporation at their Bradford Road Works.

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COMPANY MEETINGS

Southampton Gaslight and Coke Company

The Ordinary General Meeting of the Southampton Gaslight and Coke Company was held on Feb. 22. Brigadier E. M. Jack, C.B., C.M.G., D.S.O., D.L., the Chairman, said: Since we last met at an Annual General Meeting the Company has suffered a severe loss in the death of the late Chairman, Sir Russell Bencraft, who had been a Director for 29 years and Chairman since 1928—that is to say, for 15 years. His long experience and his great business ability were of the utmost value to the Company and his loss will be greatly felt. The Company has suffered another loss in the last few days by the death of Mr. A. W. Oke, who had been a Director for the exceptionally long period of 52 years. He was Chairman of the Newport (Isle of Wight) Gas Company, and was associated with various other gas undertakings and was highly respected.

The Directors honoured me at the General Meeting by electing me Chairman, and I feel it is a difficult task to follow a man of such outstanding personality as our late Chairman.

Mr. T. Carmichael has been elected Deputy Chairman and Mr. W. R. D. Perkins a Director to fill the vacancy caused by the death of Sir Russell. The Directors did not propose to fill the vacancy caused by Mr. Oke's death. The Board consisted of six Directors for many years, and was only increased to seven at the amalgamation with the Winchester Company. It has for long been the intention of the Directors to revert to the former number as soon as a suitable opportunity offered. Mr. S. E. Whitehead, the Company's Engineer and General Manager, has been appointed Managing Director, and Mr. G. Neil has been appointed Engineer to the Company.

As you are aware, I am precluded by Government Order from giving any information on the Company's accounts. Any proprietor who desires any information of the Company's working may inspect the accounts by giving the Secretary seven days' notice in writing of his desire so to do. The result of the year's working, however, is such as to warrant the Directors recommending the payment of full dividend on the Preference Stocks and the basic dividend of 5% for the year on the Ordinary Stock.

The report on the Planning of the Gas Industry prepared, at the request of the Ministry of Fuel and Power, by the Post-War Planning Committee of the British Gas Federation was published last October and received very favourable Press comment. The report stresses the advantages of gas as a heating medium and emphasizes the importance of coal conservation—by its annual processing of 20 million tons of coal, the Gas Industry secures gas and other products to the value of three times that of the raw coal, and the products, moreover, are better suited to the performance of specialized tasks than was the original coal. The report recommends the appointment of a National Fuel Advisory Council representative of the fuel interests and of the Ministry of Fuel and Power, and also recommends that an Integration Tribunal be created to further and expedite schemes of amalgamation and joint working.

One of the most disturbing features of the day is the serious position not only of the Gas Industry, but of the whole country, with regard to coal. Production has, for a long time, steadily declined, while demand has risen. The result has been the dwindling of stocks, added to which the past few months have brought transport difficulties and congestion which have still further affected supplies.

Loss of production is due to a variety of factors, on some of which —notably unauthorized stoppages and absenteeism—we may hold strong views, particularly in wartime; but we must not forget the other side of the picture—waste in use. While many people are undoubtedly doing their duty in this connexion, it is obvious that many more are not as careful as they might be. I would take this opportunity of emphasizing the seriousness of the coal position, and of appealing to all consumers, both domestic and industrial, to exercise the utmost economy in the use of gas and coke, and, indeed, of every form of fuel.

The coal the Company now receives is usually of decidedly inferior quality. Despite the quality and the difficulties of supply, the cost of the coal is steadily rising, the latest increase being one of over 3s. per ton dating from Jan. 1 last.

The shortage of coal has, owing to changes in manufacturing methods, produced a scarcity of coke, and it has become impossible to meet all demands for this fuel. Steps have been taken to distribute the available supplies as fairly as possible, having regard to the needs of industrial premises, hospitals, and Government establishments.

The question of the price of gas has been before your Directors for some time. You will remember that in 1940, owing to a serious drop in output, it became necessary to make a substantial increase in the price of gas, and the dividend on the Ordinary Stock for the year 1940 was reduced from 5 to 3½%. It is now no longer necessary to maintain this somewhat high price, but, owing to the need for fuel economy, the Directors have hesitated before making a reduction. They felt, however, that the Company's consumers should not be asked to pay larger gas bills than was necessary, and they decided to make a reduction by means of a graduated scale of discount to all except the smallest consumers. The block system of charge was consequently withdrawn on Oct. 1 last, and the discount scheme substituted; consumers will benefit from the reduction by some £50,000 per annum.

Many of our employees are serving in the Forces, and it is frequently our pleasure to receive letters and visits from them. Some have, unfortunately, given their lives; some have been wounded, and others made prisoners of war.

Other employees have been directed to various branches of skilled war work, and only a small proportion of their places has been filled. The result is that those who remain are called upon to work for long hours, often under arduous and trying conditions. I am pleased to say that our demands on the workers are being met in a most gratifying manner, and that the happy mutual relations which have existed for many years continue. As an example of this, a satisfactory arrangement has been agreed between employees and management for the introduction of "Pay-as-you-Earn" income tax—a measure which will remove much hardship from the taxpayer, but which will impose considerably more work on our own much depleted staff.

Cambridge Gas Company

The continued whole-hearted support given by the Cambridge University and Town Gas Light Company to the National and local Fuel Economy Campaigns was described by the Chairman of the Company (Mr. J. F. Cameron) at the annual meeting of shareholders which was held at the Head Office, 52, Sidney Street, Cambridge, on Feb. 25. The Chairman was supported by the Vice-Chairman (Mr. F. J. Dykes), Major H. McCombie, Mr. H. T. Wing, and Lt.-Col. G. F. Dale (Directors), and Mr. J. Hunter Rioch (General Manager and Secretary).

In submitting the report of the Directors, the Chairman was unable to provide details of the year's working, for security reasons, but announced that dividends at the usual rates would be paid. He also stated that to maintain the present price of gas was a matter of difficulty to the Directors, owing to the increased cost of coal, and wage rises. Thanks were accorded to Mr. Hunter Rioch and all employees for their loyal service under the prevailing difficult conditions.

A resolution was passed giving the Directors power to issue Debenture Stock up to the limit allowed by the Company's Acts, as and when required.

The retiring Directors, Mr. F. J. Dykes and Mr. H. T. Wing, together with the Auditor, Mr. W. R. Elworthy, were re-elected.

The meeting concluded with a vote of thanks to the Chairman, Directors, General Manager and Secretary, and the employees.

"All in the day's work," for this fine new canteen recently installed in a Home Counties factory means 500 *hot meals, plus* 1,000 *morning and afternoon teas. The work was carried out by the Tottenham and District Gas Company, and the equipment was supplied by Radiation Limited.*

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.